



Certifications of Calibration



PRODUCT QUALITY CERTIFICATE OF CONFORMANCE

Product Inspection & Quality Statement

All individual parts and components which make up the product being provided have been inspected and approved for manufacture. In addition, subassemblies have been inspected, tested, and accepted for final assembly. Each completed assembly has been final tested and approved for shipment.

Conformance Statement

SAGE Metering Incorporated certifies this instrument was tested in compliance with ANSI/NCSL Z540 and ISO/IEC 17025 requirements. SAGE Metering, Inc. calibration services are derived from MIL-STD-45662A. The Prime DC24 model is Met Labs approved and Met Labs is a Nationally Recognized Testing Laboratory (NRTL) which is recognized by OSHA. The tests are performed using measuring & test equipment with certified NIST traceability. (Applicable NIST numbers are available upon request). Reproduction of the complete certificate is allowed. Parts of the certificate may only be reproduced after written permission is granted by SAGE Metering, Inc.

CUSTOMER: Excellent Engineering Equipment, Inc. PURCHASE ORDER: 219239 / RMA 201812 SAGE SALES ORDER: 25319 MODEL: SIP-05-12-DC24-BIOGAS-FC **POWER REQUIREMENT: DC24 OPTIONAL OUTPUT:** Flow, 4 - 20mA 100 SCF/PULSE, 250 ms **SAGE UNIT/SENSOR SERIAL NUMBERS:** 72551-38876 Slave ID = 31 HEX, 49 DEC TAG: PRIME BAUD RATE / PRIME PARITY 19200.00 **EVEN** SUGGESTED CALIB/VALIDATION INTERVAL: 12 months after Calibration **CALIBRATION DATE:** 7/16/2019 **OPERATING PRESSURE RANGE:** $(14.7 \text{ PSIA} + \text{PSIG}) \pm 20\%$ **MAXIMUM PRESSURE RATING: 500 PSIG SENSOR TEMPERATURE RANGE:** STD: -40 to 200 F **ELECTRONICS TEMPERATURE RANGE:** 0° to +150°F (-18° to +65.56°C) **ACCURACY AT THE NORMAL 100:1 TURNDOWN:** +/- 1% Rdg + 0.5% FS **CALIBRATION REFERENCE CONDITIONS:** 70°F and 29.92" Hg PROCESS GAS / PROCESS GAS SPECIFIC GRAVITY BIOGAS: (58% CH4, 38% CO2, 0.9416 0 - 1,000 SCFM PROCESS FLOW (FS, 4-20 mA)/LowFlowCutoff **CALIBRATED FLOW 1000 SCFM PROCESS LINE SIZE** 6 in sch 10

PROCESS TEMPERATURE: 120 F **PROCESS PRESSURE: 60 INH20G CALIBRATION TECHNICIANS:** GF

ROOTS METERS 8C175 - SN 1628163; 23M232 - SN 1623164

SPECIAL NOTES:

SOFTWARE REV# 2.06

77 AMBIENT AIR ZERO in mW/GAS FLOW ZERO in mW **73**

Flow Conditioner Required

Authorization: Date: July 16, 2019



PRODUCT QUALITY CERTIFICATE OF CONFORMANCE

Product Inspection & Quality Statement

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Conformance Statement

SAGE Metering Incorporated certifies this instrument was tested in compliance with ANSI/NCSL Z540 and ISO/IEC 17025 requirements. SAGE Metering, Inc. calibration services are derived from MIL-STD-45662A. The Prime DC24 model is Met Labs approved and Met Labs is a Nationally Recognized Testing Laboratory (NRTL) which is recognized by OSHA. The tests are performed using measuring & test equipment with certified NIST traceability. (Applicable NIST numbers are available upon request). Reproduction of the complete certificate is allowed. Parts of the certificate may only be reproduced after written permission is granted by SAGE Metering, Inc.

CUSTOMER: Excellent Engineering Equipment, Inc. PURCHASE ORDER: 219189 / RMA 200858 SAGE SALES ORDER: 25192 MODEL: SIP-05-12-DC24-FC-BIOGAS **POWER REQUIREMENT: DC24 OPTIONAL OUTPUT:** Flow, 4 - 20mA 100 SCF/PULSE, 250 ms **SAGE UNIT/SENSOR SERIAL NUMBERS:** 85117-44527 Slave ID = 31 HEX, 49 DEC TAG: PRIME BAUD RATE / PRIME PARITY 19200.00 **EVEN** SUGGESTED CALIB/VALIDATION INTERVAL: 12 months after Calibration **CALIBRATION DATE:** 5/22/2019 **OPERATING PRESSURE RANGE:** $(14.7 \text{ PSIA} + \text{PSIG}) \pm 20\%$ **MAXIMUM PRESSURE RATING: 500 PSIG SENSOR TEMPERATURE RANGE:** STD: -40 to 200 F **ELECTRONICS TEMPERATURE RANGE:** 0° to +150°F (-18° to +65.56°C) **ACCURACY AT THE NORMAL 100:1 TURNDOWN:** +/- 1% Rdg + 0.5% FS **CALIBRATION REFERENCE CONDITIONS:** 70°F and 29.92" Hg PROCESS GAS / PROCESS GAS SPECIFIC GRAVITY BIOGAS: (58% CH4, 38% CO2, 0.9416 PROCESS FLOW (FS, 4-20 mA)/LowFlowCutoff 0 - 1,000 SCFM **CALIBRATED FLOW 1000 SCFM PROCESS LINE SIZE** 6 in sch 10 PROCESS TEMPERATURE: 120 F

PROCESS PRESSURE: 60 INH20G

CALIBRATION TECHNICIANS: GF

ROOTS METERS 8C175 - SN 1628163; 23M232 - SN 1623164

SPECIAL NOTES:

SOFTWARE REV# 2.09

74 AMBIENT AIR ZERO in mW/GAS FLOW ZERO in mW 71

Flow Conditioner Required

Authorization: Date: May 22, 2019



PRODUCT QUALITY CERTIFICATE OF CONFORMANCE

Product Inspection & Quality Statement

All individual parts and components which make up the product being provided have been inspected and approved for manufacture. In addition, subassemblies have been inspected, tested, and accepted for final assembly. Each completed assembly has been final tested and approved for shipment.

Conformance Statement

SAGE Metering Incorporated certifies this instrument was tested in compliance with ANSI/NCSL Z540 and ISO/IEC 17025 requirements. SAGE Metering, Inc. calibration services are derived from MIL-STD-45662A. The Prime DC24 model is Met Labs approved and Met Labs is a Nationally Recognized Testing Laboratory (NRTL) which is recognized by OSHA. The tests are performed using measuring & test equipment with certified NIST traceability. (Applicable NIST numbers are available upon request). Reproduction of the complete certificate is allowed. Parts of the certificate may only be reproduced after written permission is granted by SAGE Metering, Inc.

CUSTOMER: Excellent Engineering Equipment, Inc.
PURCHASE ORDER: 219189

SAGE SALES ORDER: 25192

MODEL: SIP-05-12-DC24-FC-BIOGAS

POWER REQUIREMENT: DC24

OPTIONAL OUTPUT: Flow, 4 - 20mA 100 SCF/PULSE, 250 ms

SAGE UNIT/SENSOR SERIAL NUMBERS: 174992-73674 Slave ID = 31 HEX, 49 DEC

TAG:

PRIME BAUD RATE / PRIME PARITY 19200.00 EVEN

SUGGESTED CALIB/VALIDATION INTERVAL: 12 months after Calibration

CALIBRATION DATE: 5/22/2019

OPERATING PRESSURE RANGE: $(14.7 \text{ PSIA} + \text{PSIG}) \pm 20\%$

MAXIMUM PRESSURE RATING: 500 PSIG

SENSOR TEMPERATURE RANGE: STD: -40 to 200 F

ELECTRONICS TEMPERATURE RANGE: 0° to +150°F (-18° to +65.56°C)

ACCURACY AT THE NORMAL 100:1 TURNDOWN: +/- 1% Rdg + 0.5% FS CALIBRATION REFERENCE CONDITIONS: 70°F and 29.92" Hg

PROCESS GAS / PROCESS GAS SPECIFIC GRAVITY BIOGAS: (58% CH4, 38% CO2, 0.9416

PROCESS FLOW (FS, 4-20 mA)/LowFlowCutoff 0 - 1,000 SCFM
CALIBRATED FLOW 1000 SCFM
PROCESS LINE SIZE 6 in sch 10
PROCESS TEMPERATURE: 120 F

PROCESS PRESSURE: 60 INH20G

CALIBRATION TECHNICIANS: GF

ROOTS METERS 8C175 - SN 1628163; 23M232 - SN 1623164

SPECIAL NOTES:

SOFTWARE REV# 2.31

AMBIENT AIR ZERO in mW/GAS FLOW ZERO in mW 100 104

Flow Conditioner Required

Authorization: Date: May 22, 2019

ISSUED BY: QED Environmental Systems, Inc. Services Facility

Date Of Calibration: April 23, 2018 Certificate Number: G501950 10/34110



No. 66916

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Approved By Signatory

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QED Environmental Systems, Inc. Services Facility, 2355 Bishop Circle West, Dexter, MI 48130

www.qedenv.com

John Parisho Laboratory Inspection

Customer:

Diamond Scientific LLC

PO Box 348 Mims, FL 32754 USA

Description:

Gas Analyser

Model:

GEM5000

Serial Number:

G501950

Accredited Results:

Methane (CH4)					
Certified Gas (%) Instrument Reading (%) Uncertainty (%)					
5.0	4.9	0.42			
15.0	14.9	0.66			
50.0	49.5	1.03			

Carbon Dioxide (CO2)					
Certified Gas (%) Instrument Reading (%) Uncertainty (%)					
5.0	4.8	0.43			
15.0	14.7	0.71			
50.0	50.0	1.19			

Oxygen (O2)			
Certified Gas (%)	Instrument Reading (%)	Uncertainty (%)	
20.7	20.8	0.25	

Gas cylinders are traceable and details can be provided if requested.

CH4, CO2 readings recorded at:

32.2 °C/89.9 °F

Barometric Pressure:

29.18 "Hg

O2 readings recorded at:

22.6 °C/72.7 °F

Method of Test: The analyzer is calibrated in a temperature controlled chamber using reference gases. All analyzers are calibrated in accordance with our procedure ISP-17 using high purity grade gas.

All calibrations are performed in accordance with ISO 17025 at LANDTEC, an ISO 17025:2005 – accredited service facility through PJLA.

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with NIST requirements.

The calibration results published in this certificate were obtained using equipment capable of producing results that are traceable through NIST to the International System of Units (SI). Certification only applies to results shown. This certificate may not be reproduced other than in full, except with the prior written approval issuing laboratory.

PJLA ACCREDITED CALIBRATION LABORATORY NO. 66916

Certificate Number G501950_10/34110

Page 2 of 2

Non Accredited results:

	Pressure Transducers (inches of water column)						
Transducer	Transducer Certified (Low) Reading (Low) Certified (High) Reading (High) Accuracy						
Static	Static 0" 0" 40" 39.79" 2.0"						
Differential							

Barometer (mbar)			
Reference Instrument Reading			
0988 mbar / 29.18 "Hg	0988 mbar / 29.19 "Hg		

As received gas check readings:

Methane (CH4)				
Certified Gas (%) Instrument Reading (%)				
5.0	5.9			
15.0	10.5			
50.0	44.2			

Carbon Dioxide (CO2)			
Certified Gas (%) Instrument Reading (%)			
5.0	27.8		
15.0	89.6		
50.0	100.0		

Oxygen (O2)		
Certified Gas (%) Instrument Reading (%)		
20.7	18.9	

As received Gas readings recorded at: 32.2 °C/89.9 °F
As received Barometric Pressure recorded at: 22.6 °C/72.7 °F

End of Certificate

ISSUED BY: QED Environmental Systems, Inc. Services Facility

Date Of Calibration: June 14, 2019 Certificate Number: G503692 9/36838



No. 66916

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Approved By Signatory



QED Environmental Systems, Inc. Services Facility, 2355 Bishop Circle West, Dexter, MI 48130

www.qedenv.com

Dan McCarty Laboratory Inspection

Customer:

DIAMOND SCIENTIFIC LLC

PO BOX 348 MIMS, FL 32754 USA

Description:

Gas Analyser

Model:

GEM5000

Serial Number:

G503692

Accredited Results:

Market Market St.	Methane (CH4)				
Certified Gas (%) Instrument Reading (%) Uncertainty (%)					
5.0	4.8	0.42			
15.0	14.8	0.66			
50.0	49.5	1.03			

Carbon Dioxide (CO2)					
Certified Gas (%) Instrument Reading (%) Uncertainty (%					
5.0	4.9	0.43			
15.0	14.9	0.71			
50.0	50.0	1.19			

Oxygen (O2)				
Certified Gas (%) Instrument Reading (%) Uncertainty (%)				
20.7	20.8	0.25		

Gas cylinders are traceable and details can be provided if requested.

CH4, CO2 readings recorded at:

33.6 °C/92.5 °F

Barometric Pressure:

28.92 "Hg

O2 readings recorded at:

23.2 °C/73.8 °F

Method of Test: The analyzer is calibrated in a temperature controlled chamber using reference gases. All analyzers are calibrated in accordance with our procedure ISP-17 using high purity grade gas.

All calibrations are performed in accordance with ISO 17025 at LANDTEC, an ISO 17025:2005 – accredited service facility through PJLA.

The calibration results published in this certificate were obtained using equipment capable of producing results that are traceable through NIST to the International System of Units (SI). Certification only applies to results shown. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

Calibration Instance: 102 IGC Instance: 102

LP015LNANIS

PJLA ACCREDITED CALIBRATION LABORATORY NO. 66916

Certificate Number G503692_9/36838

Page 2 of 2

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with NIST requirements.

Non Accredited results:

	Pressure Transducers (inches of water column)					
Transducer	Transducer Certified (Low) Reading (Low) Certified (High) Reading (High) Accuracy					
Static	0"	0.00"	40"	39.98"	2.0"	
Differential	0"	0.00"	4"	3.98"	0.7"	

Barometer (mbar)		
Reference	Instrument Reading	
0979 mbar / 28.92 "Hg	0980 mbar / 28.93 "Hg	

As received gas check readings:

Methane (CH4)		
Certified Gas (%)	Instrument Reading (%)	
5.0	4.9	
15.0	15.2	
50.0	48.6	

Carbon Dioxide (CO2)		
Certified Gas (%)	Instrument Reading (%)	
5.0	5.0	
15.0	15.3	
50.0	51.4	

Oxygen (O2)		
Certified Gas (%)	Instrument Reading (%)	
20.7	20.3	

As received Gas readings recorded at: 33.6 °C/92.5 °F
As received Barometric Pressure recorded at: 23.2 °C/73.8 °F

End of Certificate

Calibration Instance: 102 IGC Instance: 102

ISSUED BY: QED Environmental Systems, Inc. Services Facility

Date Of Calibration: November 20, 2019 Certificate Number: G501950_9/37950



No. 66916

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Approved By Signatory



QED Environmental Systems, Inc. Services Facility, 2355 Bishop Circle West, Dexter, MI 48130

www.qedenv.com

Timothy Hutchins Laboratory Inspection

Customer:

DIAMOND SCIENTIFIC

PO BOX 348 MIMS, FL 32754 USA

Description:

Gas Analyser

Model:

GEM5000

Serial Number:

G501950

Accredited Results:

Methane (CH4)			
Certified Gas (%)	Instrument Reading (%)	Uncertainty (%)	
5.0	4.9	0.42	
15.0	14.9	0.66	
50.0	49.5	1.03	

Carbon Dioxide (CO2)			
Certified Gas (%)	Instrument Reading (%)	Uncertainty (%)	
5.0	4.9	0.43	
15.0	14.8	0.71	
50.0	50.2	1.19	

Г		Oxygen (O2)	
	Certified Gas (%)	Instrument Reading (%)	Uncertainty (%)
Г	20.9	21.0	0.25

Gas cylinders are traceable and details can be provided if requested.

CH4, CO2 readings recorded at:

30.1 °C/86.2 °F

Barometric Pressure:

29.19 "Hg

O2 readings recorded at:

21.4 °C/70.5 °F

Method of Test: The analyzer is calibrated in a temperature controlled chamber using reference gases. All analyzers are calibrated in accordance with our procedure ISP-17 using high purity grade gas.

All calibrations are performed in accordance with ISO 17025 at LANDTEC, an ISO 17025:2005 – accredited service facility through PJLA.

The calibration results published in this certificate were obtained using equipment capable of producing results that are traceable through NIST to the International System of Units (SI). Certification only applies to results shown. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

Calibration Instance: 104 IGC Instance: 104

LP015LNANIS

PJLA ACCREDITED CALIBRATION LABORATORY NO. 66916

Certificate Number G501950 9/37950

Page 2 of 2

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with NIST requirements.

Non Accredited results:

Pressure Transducers (inches of water column)					
Transducer	Certified (Low)	Reading (Low)	Certified (High)	Reading (High)	Accuracy
Static	0"	0.00"	40"	40.25"	2.0"
Differential	0"	0.00"	4"	3.97"	0.7"

Barometer (mbar)		
Reference	Instrument Reading	
0988 mbar / 29.19 "Hg	0988 mbar / 29.19 "Hg	

End of Certificate

Calibration Instance: 104 IGC Instance: 104